

## **Attachment A: Project Scope of Work**

### **Proposed Study Team:**

Daniel D. Huppert, School of Marine Affairs, University of Washington  
Gareth Green, Albers School of Business and Economics, Seattle University  
William Beyers, Department of Geography, University of Washington

### **Expected Time Frame:**

Draft report due by November 2003  
Final report to be completed by mid December 2003

### **Rationale:**

A review of the economics of water use from the mainstem of the Columbia River will take place in the context of Governor Locke's Columbia River Initiative (CRI). The Governor has proposed the CRI as a way to address the legal, scientific, and political issues related to water use in the basin. The specific purpose of the CRI is to establish the conditions under which the Department of Ecology would make water resource decisions related to the mainstem of the Columbia River.

To accomplish the purpose of the CRI the state has contracted with the National Academy of Sciences to conduct a review of the existing science relating salmon survival and water withdrawals from the river.

Similarly, the state will contract with a group of natural resource economists to conduct a review of existing economics literature to: 1) establish the value of water for both instream and out-of-stream uses; 2) complete a sensitivity analysis of these values; 3) show differences in cost versus return for a set of management scenarios; 4) describe the likely distributional impacts, of costs and returns (e.g. by sectors, income levels, private, public, etc.); and, 5) Distinguish between likely short and long-term economic impacts. Information generated by the study will be one element of information used to inform the rule making process the Department of Ecology will conduct to formalize the outcomes from the CRI. It could also be used to identify water uses for which the state or others may wish to make additional water available.

### **Study Approach:**

Because of the short time frame available for the study and the limitations of the budget, the team will rely mainly on existing literature to generate its report. This existing work will be used to draw conclusions/implications regarding the issues associated with the Columbia River Initiative. To the maximum extent feasible the study team will employ conventional and professionally recognized methods and peer reviewed and recognized authoritative sources. When there are compelling reasons to depart from such methods and sources the rationale for their use will be explained.

The development of new models and/or research based upon primary data collection is not anticipated as a part of the review.

To guide the work of the study team, the Washington State Department of Ecology (Ecology) has provided a set of draft management scenarios describing the amount of water to be allocated and the various conditions under which this might occur. These scenarios are cast at the level of policy guidance, rather than as specific projects for implementation. Consequently, the Team will have to first scope out the implications of the 4 scenarios, develop a set of likely water allocations for each (volume and price for each category of user), and then go on to assess the economic consequences.

To provide a vehicle for public participation in the study process, an Economics Advisory Committee (EAC) composed of interested stakeholders will be established by the Department of Ecology. The EAC will be convened twice. At the outset of the review, an EAC meeting will be held to provide input regarding the existing literature resources available to the study team. The Study Team will use this first meeting to get the stakeholders' views of what changes are likely to occur in regional economic activities under the 4 management scenarios. A second EAC meeting will be held once a draft report has been generated to solicit input from the group. The role of the EAC is solely advisory: to provide the study team with advice that is informed by EAC members experience and expertise. The study team itself is responsible for determining the content of the final report and is not expected to reach consensus among the EAC members on issues that may be in dispute.

### **Issues and Work Plan:**

#### ***1. Irrigated Agriculture***

Contained within the boundaries of the Columbia Basin project and elsewhere in the basin there are substantial acreages for which agricultural development is technically feasible. Whether development is economically feasible remains an open question.

In this sub-section the study team's task is to look at the value of using water for new irrigation development. As previously discussed, the study team would build on studies done at WSU and elsewhere. The study team would rely on its own knowledge as well as guidance from the EAC to identify potential sources of information. Where it is feasible the study team will update existing study results to present and anticipated future conditions.

There are several related issues:

- a. How much irrigation relying on the Columbia River exists within Washington? What crops are grown? At what cost? And with what value? How much water is used to grow these crops?
- b. What are the net economic effects of bringing new lands under irrigation?

#### ***2. Municipal and Industrial***

The cities along the Columbia have historically relied upon the river as a source of water supply. The study team will examine the value of water for such uses, or at least to gauge whether these values are at least as large as diversions for agriculture.

Records of water purchases for municipal and industrial use in the region and elsewhere may provide some evidence of value of water to cities. The study team will

consider studies in other states that compare the economic return per unit of water used from agriculture with the returns generated by municipal uses.

### **3. *Hydropower***

The study committee will examine the potential effects that the out-of-stream use of water would have on hydropower generation. The study team will rely on the Department of Ecology to provide management scenarios that describe the amount of water used, and the likely points of diversion.

### **4. *Flood control***

The study team will examine the effect the off-stream use of water would have on flood control. The study team will rely on the Department of Ecology to provide management scenarios that describe the amount of water used, and the likely points of diversion.

### **5. *Navigation***

The study team will evaluate the potential for any effects on navigation to occur. It is assumed that effects would occur only if water diversions were sufficient to lower the pools by an amount that would interfere with normal barge draft, or result in inadequate water for lockage.

If navigation were impacted, the economic effects might be estimated by reference to the Army Corps of Engineers Lower Snake EIS study, among others.

### **6. *Endangered Species Recovery***

Whenever water allocation is discussed in the Columbia Basin, the potential effects on endangered species are raised as a concern. The risk to salmon survival resulting from the diversion of water from the river is the topic of the National Academy of Sciences (NAS) study currently underway. However, because the NAS review is not due to be completed until early next year the study team will rely upon management scenarios provided by the Department of Ecology that attempt to describe the range of likely outcomes from the NAS review.

The use values and non-use values of the listed species (primarily salmon and steelhead) are addressed separately under points 7 and 9 below. However, there are several other ways that reallocating water out-of-stream might have an economic effect on endangered species:

- a. The diversion of this water might have a marginal negative effect on species recovery. This could prolong the recovery period, perpetuating the costs of recovery. A National Academy of Sciences Panel, sponsored by the State of Washington will identify the effects of water allocations on salmon recovery.
- b. The negative effects from diverting this water could make necessary other mitigating recovery measures somewhere else in the system, with cost consequences.
- c. The last reasonably healthy salmon population on the Columbia is located within the study area on the Hanford Reach. The study team will develop a set of information to scope out the economic losses that could be associated with damage to that population.

## **7. *Recreation and Commercial Fishing***

The significant amount of water-based recreation and commercial activity could be affected by water reallocation. Reservoir boating and sport harvest of resident fish could be affected. Sport and commercial harvest of anadromous fish could also be affected.

The study team will provide estimates of marginal values and impacts associated with changes in recreational and commercial fishing. The economic effects of Ecology's management scenarios on fish populations and recreation cannot be determined in the absence of a biological, fish population assessment of the effects. Hence, precision in the values and impacts on recreation and fishing will depend upon whether NAS study, or other fish population impact information, provides clear guidance on biological effects.

## **8. *Regional and secondary effects***

Items 1 through 7 above focus on the direct economic effects on these uses of water. Decision makers will also be interested in how these impacts propagate into income and employment effects in Washington and the more directly affected sub-area.

Since the study team is not expected to build new regional models for this study, we will rely on the existing input-output models of Washington and Oregon economies. The regional economics component of the Corps of Engineers Lower Snake EIS study includes estimates of multipliers for the Lower Columbia Dam area, and for the State of Washington, that might be used to estimate these effects.

## **9. *Passive use***

One of the more contentious issues addressed in the Corps of Engineers Lower Snake EIS study was the quantification of what are called passive use, non-use, or existence values associated with alternative scenarios for the Lower Snake River. The same issues confront us about the impacts of alternative uses of water in the mainstem Columbia. In this case, the issues are whether the out-of-stream use of water will have some marginal effect on salmon survival and thus have existence value, and whether marginal flow changes in the lower river affect its aesthetics (etc.) and thus a non-market value.

Using available sources of information, the study team will describe the issue and its possible magnitude. A contingent valuation study that would attempt to quantify these effects is beyond the scope of this study.

## **10. *Water Markets***

Would a water market be a useful tool for managing the Columbia River? What conditions are necessary to support a market for water? How could a market be implemented?

The study team will describe the conditions necessary to support a water market for the mainstem of the Columbia River, and comment on what steps could be taken to implement a water market in the short run.

Extensive literature related to the design, benefits, and limitations of water markets are already available. The Independent Economic Analysis Board of the NW Power Council recently released a report addressing the possible uses of markets for augmenting stream flows for endangered fish recovery. An appendix to that report contains an annotated bibliography of studies related to water markets in the Northwest. The study team will use those references, as well as others, to summarize and describe the possible role of water markets in making water use more economically efficient and responsive to user group demands.

### ***Steps in the Analysis***

#### ***Step 1***

Because the draft management scenarios being considered by the State provide broad guidance regarding future water allocation policy, the study team will need to develop a set of specific water allocation and use actions likely to occur under each scenario. That is, if there is to be a given increase in diversionary right or a specific fee charged for additional rights, the effects of those actions need to be stipulated based upon which water-using sectors are likely to obtain the new water rights, when the rights are likely to be allocated, and where specifically in the region the water is likely to be used. Hence, the study team will need to devote some time to determining how the State's management scenarios are likely to change water use patterns which would then cause related economic effects. This stage of the study will take much of the first half of the project period, and should be concluded by about mid-September. The procedure used to determine these specifics will involve inferences from known water use patterns, and contacts with affected waters users, including the Economics Advisory Committee (EAC).

#### ***Step 2***

After establishing the specific changes in regional water use and economic activities likely to follow from each management scenario, the study team will apply existing information regarding water values, non-market values, and economic impacts to assess the consequences. This step will be completed in draft by early November, followed by a review meeting with the EAC. Comments and information from the EAC and others will be considered in a revision of the draft report into a final report by December 15, 2003.